

FASTER - A Tool for DSN Forecasting and Scheduling
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FASTER, the Forecasting And Scheduling Tool for Earth-based Resources is a suite of software tools developed at JPL (Jet Propulsion Laboratory) to aid in the process of allocating DSN (Deep Space Network) 70 and 34 meter antennas and equipment to support deep space satellites (e.g., Galileo and Voyager) and ground based astronomy (e.g., SETI and Goldstone Solar System Radar).

The 70 and 34 meter networks of the DSN presently include a total of 9 antennas at three sites around the world (with plans for 3 to 9 more antennas in the next ten years). In addition, there are multiple transmitters, receivers and other pieces of equipment that must be coordinated with the antennas. Currently, approximately 200 activities are scheduled weekly for these antennas and the numbers continue to grow. On average only 50-60% of requirements are met and any improvement in scheduling efficiency can result in significant additional science return. Additionally, these schedules must be generated significantly in advance of real time (6 months - 1 year) so that other more detailed planning may be carried out. In the area of long term forecasting, lead times for both resource augmentation and project (spacecraft) development are measured in years and costs are in 100's of millions of dollars; therefore, it is of utmost importance to properly size both resources and mission mix.

FASTER has been designed for use by a diverse user community, including mid-level managers, data entry and analysis teams, and project scheduling personnel. The system helps to automate many of the previously labor intensive tasks and ensure proper analysis and consistency throughout all phases of the allocation process. Some of the areas of interest include

- > evaluating different candidate resource sets in support of resource augmentation and upgrade plan generation
- > evaluating proposed mixes of missions and requirements in support of mission and requirements approval
- > generating detailed antenna and equipment allocation plans
- > identifying and resolving resource conflicts
- > disseminating data products for use in other planning functions

FASTER implements an interactive environment for both forecasting and scheduling. The scheduling tool is based upon a two pass algorithm; the first pass performs a statistical analysis of resource demand while the second pass uses this information to drive a dynamic programming algorithm for group activity scheduling. The forecasting tool uses the scheduling first pass algorithm

to generate metrics that are both consistent with scheduling and designed to give insight into resource and requirement problems.

- This paper will discuss technical aspects of the FASTER system, including
- > forecasting and scheduling algorithms
 - > issues related to large scale use of a scheduling and forecasting system
 - > implications to the process in which a forecasting and scheduling system is embedded
 - > lessons learned and implications to similar systems.